

whorls there are retractive growth wrinkles and forwardly descending series of minute rather inconspicuous papillae, which are scarcely visible on the last whorl, where the wrinkles are smooth or in places slightly roughened. The whorls are convex and increase slowly. The suture is rather deeply impressed throughout, and descends very little in front. The aperture is shortly oval, peristome very narrowly expanded basally, slightly dilated at the columellar margin.

Height 9 mm., diam. 15.5 mm.; $5\frac{1}{4}$ whorls.

This form differs from *H. mohaveana* (= *H. riparia*) and *H. jaegeri* by its more closely coiled whorls, the last one noticeably narrower in an apical view. It resembles *H. graniticola* Berry in this respect, but differs from that by the decidedly wider umbilicus, contained 6 to $6\frac{1}{2}$ times in the diameter, while in *H. graniticola* it is contained 8 times.

NOTES ON ACMAEA FUNICULATA (CARPENTER)

BY G. D. HANNA AND ALLYN G. SMITH

There seems to be much uncertainty regarding this interesting shell. It was described only too briefly by Carpenter from Monterey, California, in 1864, and has never been figured. Pilsbry gave a translation in 1891, and this was copied verbatim by Oldroyd in 1927. The little additional published information may be found in the citations below.

We recently enjoyed a day of dredging in Monterey Bay, and among other interesting things we obtained a fine shell of this form. It was "dead" but in excellent condition.

While discussing the generic determination recently with Mr. George Willett, he agreed that there was some doubt as to the correctness of the assignment to "*Acmaea*" where it has been placed since Pilsbry wrote his treatise. Mr. Willett had much additional information to offer. He has dredged it at Forrester Island, Alaska, and in the channel

between Catalina Island and the mainland he obtained the largest and most beautiful specimens we have seen. He very kindly supplied the following notes for inclusion herewith:

"The only specimen of *Acmaea funiculata* I have taken in Alaska was dredged in 20 fathoms off Forrester Island. It is a small one, measuring in millimeters 10.7x9.3, alt. 5.5. Of seven specimens dredged in 30 to 40 fathoms off Catalina Island, the largest measures 20x17.5, alt. 11.8. An exceptionally elevated example measures 17.7x15, alt. 12.5. I have examined hundreds of specimens of *Acmaea mitra* without finding any intergradation with *funiculata*."

Some of his specimens were living when dredged and he preserved one in alcohol, which he offered to us for study. An examination of this shows conclusively that it does belong to *Acmaea* (*sensu stricto*) and has been correctly assigned a place close to the type of the genus, *A. mitra* Eschscholtz, 1830.

The animal has no branchial cordon and the branchial plume is far back on the left side of the neck. The radula has three teeth on each side of the median line as in *A. mitra* but the shape of the individual elements differs considerably from Dall's and Pilsbry's drawings of *mitra*. (See Amer. Journ. Conch., vol. 6, 1871, p. 241, pl. 14, fig. 1; and Man. Conch., vol. 13, 1891, p. 7, pl. 42, fig. 82). In that species, the teeth are broadly cordiform while in the Catalina Island *funiculata*, they are decidedly more pointed and not heart-shaped. These differences are so pronounced that figures of both radulae are reproduced herewith.

In a group of animals known to vary so widely as *Acmaea*, observations should be based on numerous individuals but in this case, as the radular differences are so pronounced and other characters are likewise different, it seems that *funiculata* should be considered as a species distinct from *mitra*, and not as a subspecies or variety.

The strong, radial ribbing of *funiculata* is well known to those who are familiar with the form at all; in *mitra*, however, there is no trace of radial sculpture except "occasion-

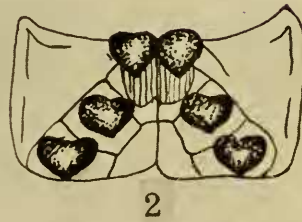
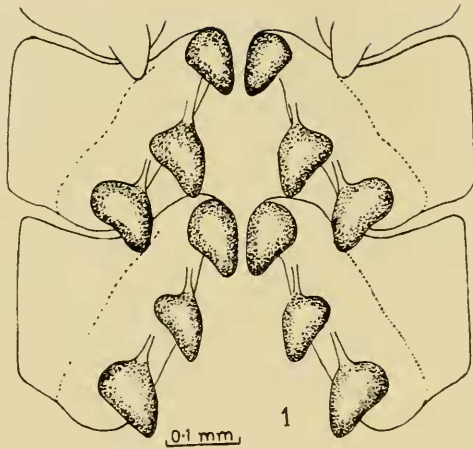


Fig. 1. *Acmaea funiculata* (Carpenter). Radula from specimen dredged by George Willett between Catalina Island and San Pedro, California.

Fig. 2. *Acmaea mitra* Escholtz. Radula, after Dall, Amer. Jour. Conch. vol. 6, 1871, p. 241, pl. 14, fig. 1.

Figs. 3, 4. *Acmaea funiculata* (Carpenter). Plesiotype No. 5412, Calif. Acad. Sci. Length 8.0 mm.; width 7.0 mm.; altitude 5.0 mm. Dredged in Monterey Bay, California, between Pacific Grove bell buoy and Del Monte wharf in 25 fms.; July 20, 1920. Photographs by A. E. Burns, Pacific Telephone and Telegraph Co., San Francisco.

ally" (according to Dall and Carpenter) in very young individuals. The habitat is likewise different. *A. mitra* is a common littoral species from Alaska to San Diego, but the ribbed *funiculata* has not been found except by dredging in fairly deep water, 20 to 50 fathoms, so far as we have been able to determine.

Carpenter's original specimen was dredged by Cooper in 1861 off Point Pinos, Monterey Bay in 20 fathoms and the latter has stated that he obtained six specimens (Amer. Journ. Conch, vol. 6, 1870, p. 60) but the location of any but the type is not known to us. They may have been in the California Academy of Sciences where many of Cooper's shells were deposited; if so, they were destroyed in the fire of 1906. The type, however, is preserved in the National Museum and Mr. Wm. B. Marshall has advised that it bears number 14799. (Letter, Nov. 28, 1930). He further stated that: "In our collection Dall treats *A. tenuisculpta* Carpenter as a synonym of *funiculata*, and, I think rightly. The type of *tenuisculpta* is No. 15490 from Neah Bay, Washington; the largest specimen, one of the type lot measures, length 21 mm., width 17 mm. The largest specimen of *funiculata* in the collection measures, length 15 mm., width 12 mm. It is No. 224634 from U. S. Bureau of Fisheries Stat. 2944, 30 fms. rocky, surface temperature 59°, Lat. 34° 00' 00", Long. 119° 28' 30", near Santa Cruz Island, California, Feb. 6, 1889.

It seems clear that *funiculata* may not reach the large size of *mitra*, and it is almost always free from the coralline algal growths and serpula borings so characteristic of the latter. In the young stages, however, *mitra* is often clean and it so happens that a good series was obtained in Monterey Bay at various times, chiefly by dredging; there is not a trace of radial sculpture in any of the lot. In addition to the specimen of *funiculata* from Monterey, illustrated herewith, we have three smaller ones from Carmel Bay. They show the same pronounced radial sculpture.

It also appears that *funiculata* is usually more acutely conical than *mitra*, more ovate in outline and the basal